PREPAREDNESS OF EDUCATIONAL MANAGERS FOR APPLICATION OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN THE MANAGEMENT OF SECONDARY SCHOOLS IN ANAMBRA STATE

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Abstract

The study determined the preparedness of educational managers for application of artificial intelligence and machine learning in the management of secondary education in Nigeria. Two research questions and two hypotheses guided the study. The descriptive survey research design was adopted for the study. The population of the study consisted of about 3000 education managers drawn from the six geopolitical zones in Nigeria (North Central, North East, North West, South West, South East, and South South). The sample of the study constituted 600 education managers drawn from the entire population using stratified random sampling technique. Instrument for data collection was a structured questionnaire developed by the researcher on a 5-point rating scale of Very High Extent, High Extent, Moderate Extent, Low Extent and Very Low Extent. The instrument was validated by three experts in the Department of Educational Management and Policy, Faculty of Education, Nnamdi Azikiwe University Awka. The reliability of the instrument was determined using Cronbach alpha technique and obtained a coefficient of 0.77. The instruments were administered directly by the researcher to the respondents with the help of six research assistants. Out of 600 copies of questionnaires distributed, 580 copies made up of 310 public secondary education managers and 270 private secondary education managers were properly completed, successfully retrieved and used for Data analysis. Data collected were analyzed using mean scores to answer the research questions while t- test was used to test the hypothesis at 0.05 level of significance. The findings of the study revealed among others that preparedness of educational managers for application of artificial intelligence and machine learning in the management of secondary education in Nigeria are to a low extent with public secondary educational managers and to a high extent with private secondary educational managers. It also indicated a significant difference between their mean score ratings. Based on the findings, it was recommended that government authorities saddled with the responsibility of staff training and personnel development are urged to organize seminars, workshops and conferences for public educational managers on acquisition of relevant skills on the use of emerging technologies for application of Artificial Intelligence and machine learning in management of secondary education in Nigeria to attain preparedness. Also the need to make adequate provision of necessary facilities and technological materials for application was deemed essential.

Keywords: *Preparedness, Educational Managers, Application, Artificial Intelligence, Machine Learning, Management*

Introduction

Science and technological advancement has brought numerous changes and innovations to today's global community and it's currently invading various sectors of the economy including education. The new development is believed to possess features that could revolutionize every sector it cuts across through efficient harnessing and application of the available models it offers. Busaidi and Hayat (2017) opined that Artificial intelligence has the potential to address a wide range of contemporary human needs, stressed that the results of recent studies comprehended by academics, students, technologists and education researchers, as well as their implementations points on benefits of artificial intelligence on development of individual race and how machine learning is beneficial in today's post pandemic learning era and in the future of education. In view of their opinion, it appeared that after the COVID-19 experiences, modification of conventional educational management patterns and learning processes became very crucial.

According to UNESCO (2023), development has been made within the framework of the Beijing Consensus, a publication aimed at fostering the readiness of education policy-makers in artificial intelligence. This implies that the use of emerging technologies at different levels of education is rapidly trending, especially integration of Artificial Intelligence and machine learning in the educational system and managers of education seem to embrace the trend. Siminto, Akib, Hasmirati, Danang and Wadiato (2023) asserted that the application of artificial intelligence can improve the ability of prediction, data analysis, adaptation, personalization in curriculum management, student performance evaluation, and the provision of learning resources tailored to individual needs. These showed that educational managers can explore the use of artificial intelligence in administrative processes and resource management. Siminto, Akib, Hasmirati, Danang and Wadiato (2023) further stressed that the education environment is full of data and information hence effective and efficient management is vital to achieving educational goals. In situations where administrative tasks and processing of a series of data seems vast and rigorous, educational managers can implore artificial intelligence for support of tasks in computation accuracy, precision, prompt analysis and reporting of data. Considering an efficient information system, educational managers can also explore artificial intelligence models that are compatible with educational management information systems for their executive information reporting, dissemination of information and timely decision making.

In Henri Fayol's administrative management theory, emphasis was on formal structures and clear roles that provided a comprehensive framework for effective and efficient management of the organization. These are obtainable in educational management with strict application of his enlisted management functions of planning, organizing, commanding, coordinating and controlling of the operational activities. To ensure enhanced productivity in the educational institutions these managerial functions and responsibilities demand full dedication and by extension support systems. Yohanes, Renny and Rini (2023), in their opinion asserts that implementation of artificial intelligence in evaluation systems provides the potential to produce more accurate and efficient analysis, aiding better decision making in a variety of contexts. Thus, viewing the cumbersome nature of some routine management process, analysis, prompt demand of reports and feedback from superiors and other various administrative functions, educational managers are most likely to accept support of supplementary measures that proffers relief to tasks.

Most of the major factors that contribute to the success of any educational institution are usually linked to effective and efficient management of the system, irrespective of the educational level. Educational management is the cornerstone for institutional sustenance and cuts across all areas of education including curriculum development. The current trend of innovations in education tends to demand for the provision of opportunities to integrate machine learning in various dimensions of curriculum content development to enhance efficiency in teaching and learning. Wiston and Francisca (2023) noted that current curricula are constantly updated and with that in mind, curriculum development must provide answers to the demands imposed by the knowledge society and must include topics and activities based on Machine Learning And Artificial intelligence at all school levels. They further emphasized that integration of smart technologies is a crucial educational

innovation across all subject areas and educational levels. These opinions implied that curriculum developers should include opportunities that allow integration of machine learning in the teaching and learning processes. In a different dimension, Arantes (2023) pointed out implementation of strategies that take into account the individual needs of students, such as adaptive learning that tailors teaching materials and methods to each student's learning style.

However, Rashmi (2024) noted that although many challenges and drawbacks come with AI, the key is to maneuver accordingly towards the anticipated goals in an educational institution with the chosen priority ought to be adopted. Obviously, the use of artificial intelligence and machine learning might have their peculiar challenges, however managerial experiences and expertise developed by educational managers over the years will enable them to devise possible measures to overcome. UNESCO (2023) stated that commitments are made to support Member States to harness the potential of AI technologies for achieving the Education 2030 Agenda, while ensuring that its application in educational contexts is guided by the core principles of inclusion and equity. Meanwhile, personnel training and development on adjustment to the required skills and competences becomes apt. Also, availability of the necessary facilities and equipment that are compatible with the Artificial Intelligence and machine learning models seemed essential.

Research Questions

The study was guided by two research questions:

1. To what extent are educational managers prepared for application of artificial intelligence in the management of secondary education in Nigeria?
2. To what extent are educational managers prepared for application of machine learning in the management of secondary education in Nigeria?

Hypotheses

Two Null Hypotheses were tested for the study:

1. There is no significant difference between the mean ratings of public and private educational managers on the extent of preparedness for application of artificial intelligence in management of secondary education in Nigeria.
2. There is no significant difference between the mean ratings of public and private educational managers on the extent of preparedness for application of machine learning in management of secondary education in Nigeria.

Research Method

A descriptive survey research design was adopted for the study. This design is deemed fit for this research since the researcher will collect data in a systematic manner from a given population. This study was carried out in Nigeria. The population of the study consisted of about 3000 educational managers drawn from the six geopolitical zones in Nigeria (North Central, North East, North West, South West, South East, and South South). The sample of the study constituted 600 educational managers drawn from the entire population using stratified random sampling technique. The researchers developed an instrument titled 'Preparedness of Educational Managers for Application of Artificial Intelligence and Machine Learning in the Management of Secondary Education in Nigeria Questionnaire (PAIMLMSENQ)' was used for data collection. The instrument was structured on a 5-point rating scale of Very High Extent, High Extent, Moderate Extent, Low Extent and Very Low Extent. The instrument was validated by three experts in the Department of Educational Management and Policy, Faculty of Education, Nnamdi Azikiwe University Awka. The reliability of the instrument was determined using Cronbach alpha technique and obtained a coefficient of 0.77. The instruments were administered directly by the researcher to the respondents with the help of six research assistants. Out of 600 copies of questionnaires distributed, 580 copies made up of 310 public secondary education managers and 270 private secondary education managers were properly completed, successfully retrieved and used for Data analysis. Data collected were analyzed using mean scores to answer the research questions while t- test was used to test the hypotheses at 0.05 level of significance.

Presentation of Results

Research Question 1: To what extent are educational managers prepared for application of artificial intelligence in the management of secondary education in Nigeria?

Table 1: Mean ratings of educational managers on the extent of preparedness for application of artificial intelligence in the management of secondary education

S/N	As an educational manager, I am prepared to apply the following artificial intelligence models in management of secondary education.	$\bar{X}$ Public Sec. Edu Managers (n - 310)	Decision	$\bar{X}$ Private Sec. Edu Managers (n - 270)	Decision
1.	Analyzing vast amount of data	3.30	ME	3.71	HE
2.	Automating administrative tasks	2.34	LE	3.01	ME
3.	Integration with existing system	3.42	ME	3.93	HE
4.	Replacing human - led teaching	1.91	LE	1.82	LE
5.	Predictive analysis of trends	2.40	LE	3.70	HE
6.	Eliminating biases	2.35	LE	4.20	HE
7.	Detecting error in computation	2.48	LE	4.05	HE
8.	Optimization of financial management	2.46	LE	3.25	ME
9.	Facilitating control of information	2.60	ME	4.50	HE
10.	Driving innovation in school system	3. 56	HE	4.44	HE
11.	Real-time feedback on performances	2. 35	LE	4.00	HE
12.	School timetable optimization	2.40	LE	3.53	HE
13.	Prompt dissemination of information	2.41	LE	4.42	HE
14.	Executive information reporting system	3.20	ME	4.48	HE
15.	Data security to enhance privacy	3.40	ME	4.50	HE
16.	Quality control	2.14	LE	3.81	HE
	Cluster Mean	**2.47**	**LE**	**3.83**	**HE**

Table 1 shows a sample size of 310 respondents with a cluster mean of 2.47 for educational managers of public secondary schools and a sample size of 270 respondents with a cluster mean of 3.83 for educational managers of private secondary schools on the extent of preparedness for application of artificial intelligence in the management of secondary education. The analysis of the 16 items shows that the respondents rated the preparedness of public educational managers for application of artificial intelligence in the management of

secondary education in Nigeria to a low extent (LE) and private educational managers to a high extent (HE). This was reflected in the widely spread of their mean rating scores.

Research Question 2: To what extent are educational managers prepared for application of machine learning in the management of secondary education in Nigeria?

Table 2: Mean ratings of educational managers on the extent of preparedness for application of machine learning in the management of secondary education.

S/N	As an educational manager, I am prepared to apply the following machine learning packages in management of secondary education.	$\bar{X}$ Public Sec Edu Managers (n - 310)	Decision	$\bar{X}$ Private Sec. Edu Managers (n - 270)	Decision
17.	Preparation of lesson plan	3.45	ME	3.31	ME
18.	Personalize learning experience	2.21	LE	3.85	HE
19.	Immediate corrections	3.56	ME	4.41	HE
20.	Identification of gaps in students' knowledge	2.40	LE	4.08	HE
21.	Content creation	2.32	LE	4.21	HE
22.	Answering students' questions	3.14	ME	3.01	ME
23.	Grants permission for solving students' assignment	2.20	LE	2.07	LE
24.	Analyze numerical data	2 .37	LE	3.58	HE
25.	Making teaching easier	3.41	ME	3.52	HE
26.	Analyze students' capabilities	3.58	ME	3.60	HE
27.	Modifying conventional processes	2.31	LE	4.50	HE
28.	Reduce instructional cost	3.01	ME	4.01	HE
29.	Students' academic data analysis	2.44	LE	4.48	HE
30.	Adaptive Learning	2.25	LE	3. 68	HE
32.	Improving course quality	3.32	ME	4.27	HE
33.	Reinforcement of concepts	2.47	LE	3.94	HE
34.	Distribution of learning materials	2.13	LE	3.71	HE
	Cluster Mean	**2.43**	**LE**	**3.56**	**HE**

Table 2 shows a sample size of 310 respondents with a cluster mean of 2.43 for educational managers of public secondary schools and sample size of 270 respondents with a cluster mean of 3.56 for educational

managers of private secondary schools on the extent of preparedness for application of machine learning in the management of secondary education. The analysis of the 18 items shows that respondents rated the preparedness of public educational managers for application of machine learning in the management of secondary education in Nigeria to a low extent (LE) and private educational managers to a high extent (HE). This was seen on the widely spread of the mean rating scores.

Hypotheses Testing

H1: There is no significant difference between the mean ratings of public and private educational managers on the extent of preparedness for application of artificial intelligence in management of secondary education in Nigeria.

Table 3: T-test comparison of public educational managers and private educational managers mean ratings on the extent of preparedness for application of artificial intelligence in management of secondary education

Group	Sample size	$\bar{X}$	SD	df	t- Cal.	t- Crit.	Decision
Public Sec Edu Managers	310	2.47	1.67	578	2.972	0.264	**Significant**
Private Sec Edu Managers	270	3.83	0.62				

The result as shown in Table 3 revealed that the calculated t-test value of 2.972 at 578 degree of freedom and 0.05 level of significance is greater than the critical value of 0.264. This shows that there is a significant difference in the mean ratings of public and private educational managers on the extent of preparedness for application of artificial intelligence in management of secondary education in Nigeria. Therefore, we reject the null hypothesis.

H2: There is no significant difference between the mean ratings of public and private educational managers on the extent of preparedness for application of machine learning in management of secondary education in Nigeria.

Table 4: T-test comparison of public educational managers and private educational managers mean ratings on the extent of preparedness for application of machine learning in management of secondary education

Group	Sample size	$\bar{X}$	SD	df	t- Cal.	t- Crit.	Decision
Public Sec Edu Managers	310	2.43	1.39	578	2.348	0.964	Significant
Private Sec Edu Managers	270	3.56	0.48				

The result as shown in Table 4 revealed that the calculated t-test value of 2.348 at 578 degree of freedom and 0.05 level of significance is less than the critical value of 0.964. This shows that there is a significant difference in the mean ratings of public and private educational managers on the extent of preparedness for application of machine learning in management of secondary education in Nigeria. Therefore, we reject the null hypothesis.

Discussion of Findings

The findings revealed that preparedness of educational managers for application of artificial intelligence and machine learning in the management of secondary education in Nigeria are to a low extent with public

secondary educational managers and to a high extent with private secondary educational managers. The findings also revealed that there was a significant difference in the mean ratings of public and private educational managers on the extent of preparedness for application of artificial intelligence and machine learning in management of secondary education in Nigeria. The findings of the study also clearly showed a wide spread in the mean and standard deviation scores as indicated on the mean rating and t-test comparison tables respectively.

The indication of a low extent of preparedness by public educational managers calls for immediate attention. This is to ensure prompt provision of possible measures for integration of current trends and innovations in educational management. This adjustment will create opportunity for educational managers to explore the benefits proffered by artificial intelligence and machine learning in their managerial functions. The indication of the widespread gap in the public and private managers' extent of preparedness shows a flaw and needs to be closed. Efforts should be made to ensure a closure of this existing gap between public and private educational managers on the extent of preparedness for application of artificial intelligence and machine learning in secondary educational management in order to achieve efficiency, enhanced productivity and ability to compete with counterparts when the need arises. These support the opinion of Siminto, Akib, Hasmirati, Danang and Wadiato (2023) who emphasized that equipping academic and administrative staff with the necessary skills to understand, manage, and utilize artificial intelligence effectively is critical. Stressing that continuous training and education is required to enable them to integrate this technology properly in the educational environment.

Conclusion

Based on the findings of the study, it was concluded that the preparedness of educational managers for application of artificial intelligence and machine learning in management of secondary education in Nigeria was to a low extent with public educational managers while a high extent was ascertained for private educational managers.

Recommendations

Based on the findings, the following recommendations were made:

1. Government's authorities saddled with the responsibility of staff training and personnel development are urged to organize seminars, workshops and conferences for public educational managers on acquisition of relevant skills on the use of emerging technologies for application of Artificial Intelligence and machine learning in management of secondary education in Nigeria to attain preparedness.
2. Appropriate departments that are responsible for provision of educational facilities and procurement of educational equipment should make available relevant materials such as computer systems, system software, programming packages etc. which are needed by public educational managers for application of artificial intelligence and machine learning in management of secondary education in Nigeria to attain preparedness.

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